

Genetic Drift

Genetic drift is a random change in allele frequencies that occurs in a small population. **Allele frequency** the proportion of a particular allele (variant of a gene) among all allele copies being considered. When a small number of parents produce just a few offspring, allele frequencies in the offspring may differ, by chance, from allele frequencies in the parents.

This is like tossing a coin. If you toss a coin just a few times, you may, by chance, get more or less than the expected 50 percent heads or tails. In a small population, you may also, by chance, get different allele frequencies than expected in the next generation. In this way, allele frequencies may drift over time.

There are two special conditions under which genetic drift occurs. They are called bottleneck effect and founder effect.

1 **Bottleneck effect** occurs when a population suddenly gets much smaller. This might happen because of a natural disaster such as a forest fire. By chance, allele frequencies of the survivors may be different from those of the original population.

2 **Founder effect** occurs when a few individuals start, or found, a new population. By chance, allele frequencies of the founders may be different from allele frequencies of the population they left. An example is described in the Figure below .



Amish horse and buggy today.

Who Are the Amish?

- There are almost 250,000 Amish people in the U.S. and Canada today. They live in small rural communities, mainly in Ohio, Pennsylvania, and New York.
- The present Amish population grew from 200 founders, who came to the U.S. from Germany and Switzerland in the mid-1700s.
- Since then, the Amish have followed a simple life style. For example they do not own cars and travel instead by horse and buggy.
- Amish people also rarely intermarry with people outside the Amish population.



Hands of an Amish child with Ellis-van Creveld syndrome

Founder Effect and the Amish Gene Pool

- One of the original 200 Amish founders carried a recessive allele for a rare condition. Called Ellis-van Creveld syndrome, the condition is a type of dwarfism. People with the syndrome have extra fingers and short limbs.
- Today, the Amish population has far more cases of this syndrome than any other population in the world.

Founder Effect in the Amish Population. The Amish population in the U.S. and Canada had a small number of founders. How has this affected the Amish gene pool?

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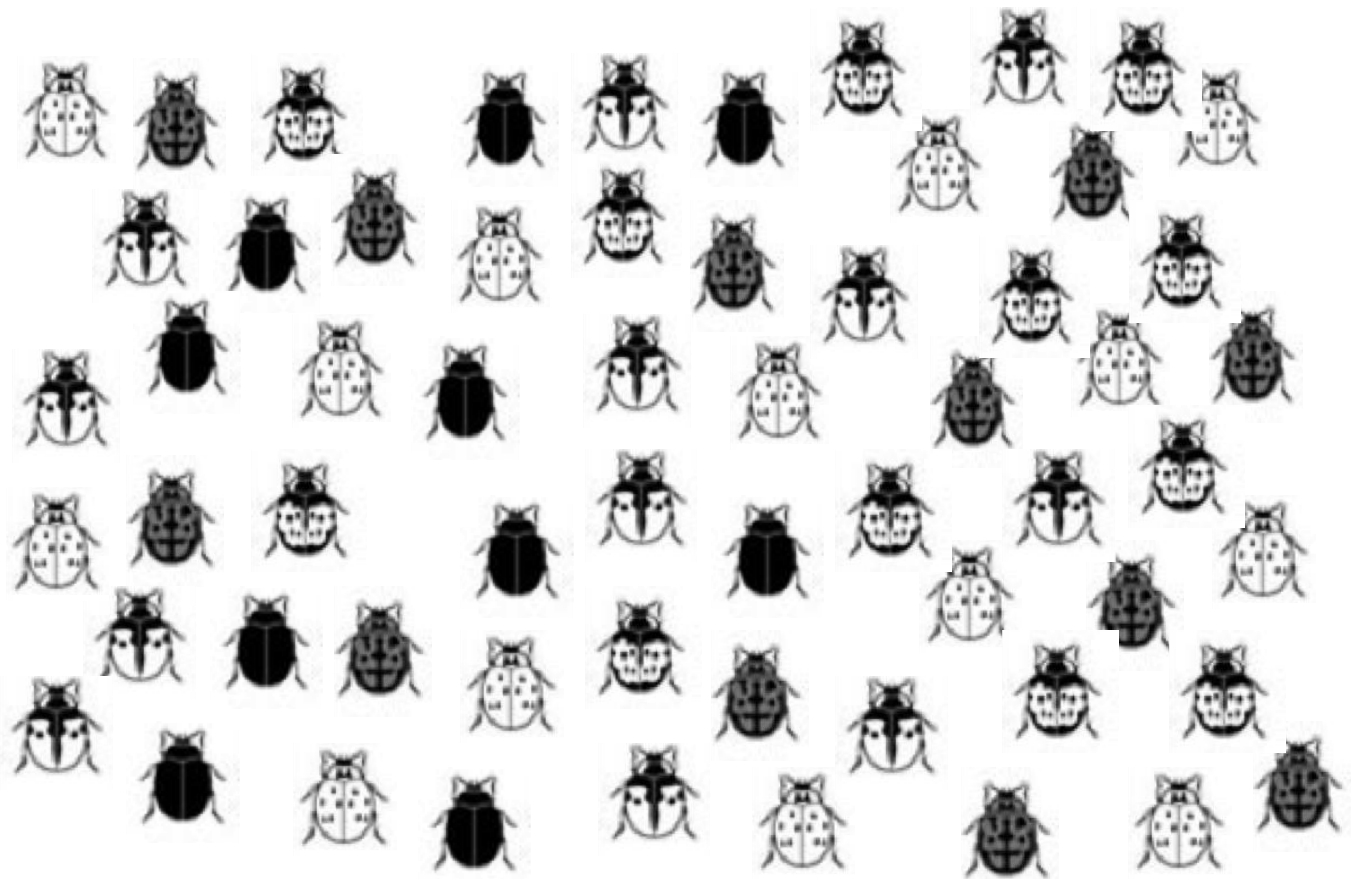


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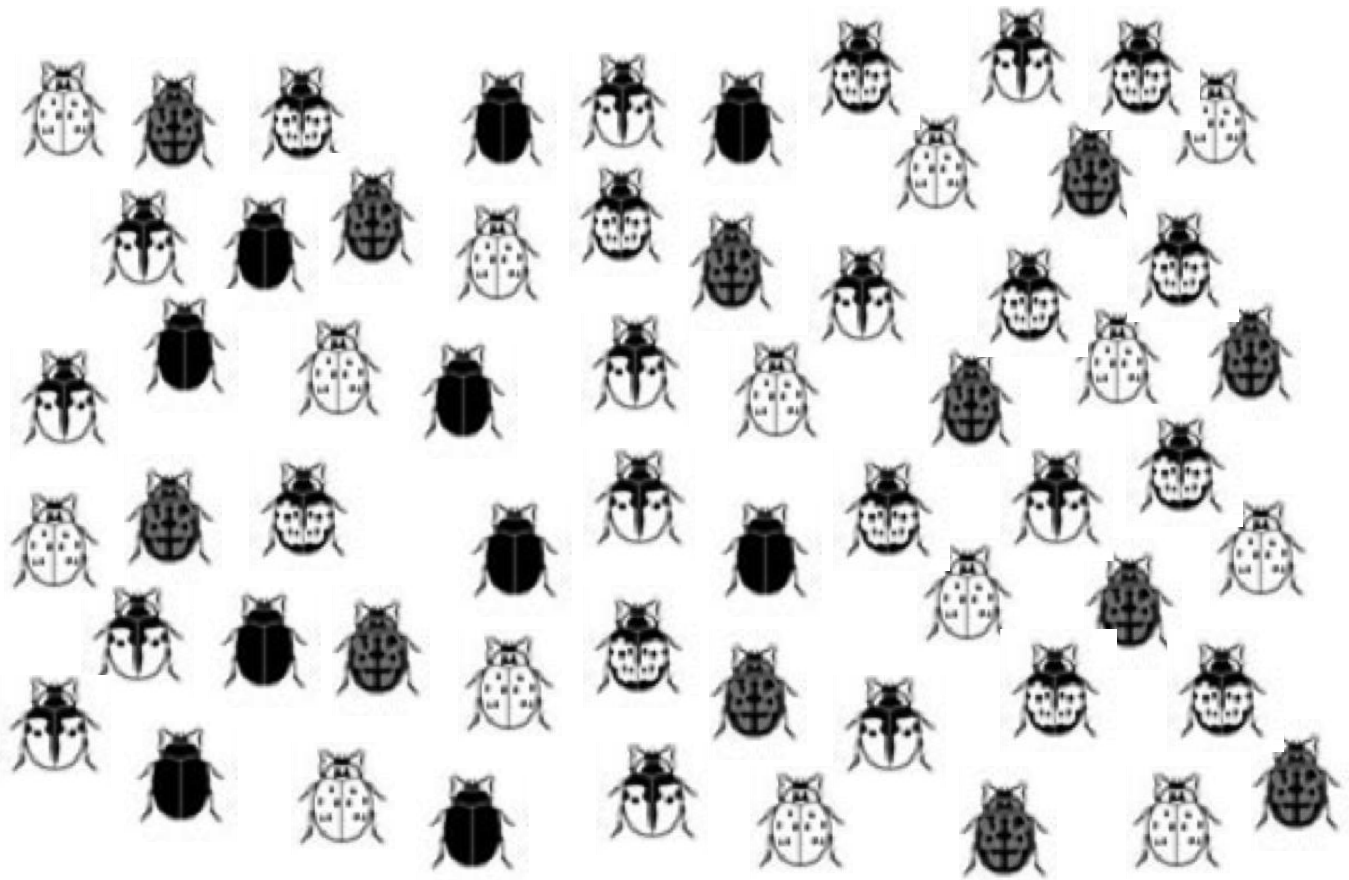
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Genetic Drift Activity

Pick a number. Find your number in the original population. The beetles in the population represent your new founding population.

1. Draw you founding population
2. Your population grows. Draw each beetle in your founding population 3 times
3. How does your new population compare to the original population?
4. How does your population compare to you neighbors population?
5. Create a short story/explanation of how your new population was create and what happen to the original population.



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